Non-technical Abstract

Erectile Dysfunction (ED) affects about 35 million men in the US and approximately 52% of men between the ages of 40 and 70 years show some degree of erectile dysfunction. Over the past 30 years the treatment of ED has evolved from a primary reliance on invasive surgery to utilization of repetitive, on-demand injections, and most recently, to the introduction of an oral medication. However, despite a billion dollars in United States sales alone, the utility of oral therapy has been hampered by limited efficacy, the need for continual on-demand dosing, and fear of severe side effects. In fact, these factors have combined to limit the use of the new drug (Viagra) to 10% of the potential market.

A phase I safety study is proposed in which a non-viral gene transfer vector containing the gene for a potassium channel will be used. The approach will involve a single injection of the gene transfer vector into the cavernosum of the penis which will direct the insertion of functional potassium channels in the membranes of the smooth muscle cells lining the cavernosum. The potassium channels will regulate the smooth muscle cell spasm/contraction of the penis by decreasing the activity of calcium channels and reducing the entry of calcium ion into the cell. Sustained levels of calcium ion are necessary to maintain smooth muscle cell contraction. Use of this gene transfer system, presumably causes those cells affected to express increased amounts of the protein that forms potassium channels and/or results in the formation of a more active K channel in the cell membrane. In either scenario, the end result is that it consequently enhances the relaxation of the smooth muscle cells, overcoming the cell spasm/contraction, and thus correcting the ED.

Preclinical animal studies performed using this system indicate that erectile function can be restored for an extended period of time following a single administration. In the proposed study, subjects will be followed for 6 months and will be evaluated using the International Index of Erectile Function questionnaire which will assess the ability of subjects to engage in sexual intercourse with their partners and a Rigiscan™ device for measurement of visual sexual stimulation and sleep-induced erection.